

Exploring Spacetime Anomalies: A Comparative Analysis of Black Holes and the Bermuda Triangle

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□ Abstract

This paper investigates conceptual parallels between astrophysical black holes and the enigmatic Bermuda Triangle. While black holes are governed by general relativity and quantum mechanics, the Bermuda Triangle’s mysteries are often attributed to natural phenomena. We propose a speculative spacetime metric for the Bermuda Triangle inspired by black hole geometry and enriched by mathematical analogies such as the infinite geometric series $1 + x + x^2 + x^3 + \dots = \frac{1}{1 - x}$, suggesting a layered quantum structure of spacetime.

□ 1. Introduction

Black holes are regions of spacetime with gravitational fields so intense that nothing escapes beyond the event horizon. The Bermuda Triangle, bounded by Miami, Bermuda, and San Juan, is associated with unexplained disappearances. This paper draws speculative parallels between these domains, exploring gravitational analogies and quantum correlations.

□ 2. Theoretical Background

2.1 Black Holes

Einstein’s field equations:

$$R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

Schwarzschild metric:

$$ds^2 = -\left(1 - \frac{2GM}{c^2 r}\right) c^2 dt^2 + \left(1 - \frac{2GM}{c^2 r}\right)^{-1} dr^2 + r^2 (d\theta^2 + \sin^2 \theta d\phi^2)$$

Hawking radiation power:

$$P \approx \frac{hc^6}{15360\pi G^2 M^2}$$

Kerr black holes allow closed timelike curves (CTCs), suggesting theoretical time loops.

2.2 The Bermuda Triangle

While lacking confirmed spacetime anomalies, speculative models suggest micro-wormholes or quantum distortions. Natural explanations include rogue waves, magnetic anomalies, and methane hydrates.

□ 3. Speculative Metric and Mathematical Analogy

We propose a weak-field Schwarzschild-inspired metric:

$$ds^2 = -\left(1 - \frac{\Phi}{c^2}\right) c^2 dt^2 + \left(1 - \frac{\Phi}{c^2}\right)^{-1} dr^2 + r^2 (d\theta^2 + \sin^2 \theta d\phi^2)$$

where $\Phi(r) = \frac{GM_{\text{eff}}}{r}$ is a hypothetical effective mass field.

To model layered quantum fluctuations, we invoke the infinite geometric series:

$$1 + x + x^2 + x^3 + \dots = \frac{1}{1 - x}, \text{ for } |x| < 1$$

This series metaphorically represents cumulative quantum perturbations or vacuum energy layers. If each perturbation contributes a fraction x of the previous, the total effect converges to a finite distortion, analogous to a weak spacetime curvature.

✧ 4. Quantum Speculation

Drawing from the Casimir effect:

$$E_{\text{fluct}} \approx -\frac{hc\pi^2 A}{720 d^4}$$

This negative energy density could hypothetically stabilize micro-wormholes. Though impractical at macroscopic scales, it supports the analogy between quantum vacuum fields and spacetime anomalies.

□ 5. Discussion and Conclusion

Black holes are well-established in physics, while the Bermuda Triangle remains speculative. However, using relativistic geometry and mathematical analogies like the geometric series allows us to formalize even fringe hypotheses. This interdisciplinary approach fosters curiosity and bridges astrophysics with terrestrial mysteries.